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## Dielectric and Optical properties of Ni doped $\text{Na}_{0.5}\text{Bi}_{0.5}\text{TiO}_3$

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### Abstract

Polycrystalline Ni doped  $\text{Na}_{0.5}\text{Bi}_{0.5}\text{TiO}_3$  samples  $(\text{Na}_{0.5}\text{Bi}_{0.5})\text{Ti}_{1-x}\text{Ni}_x\text{O}_3$ , ( $x = 0.5, 0.10, 0.15$ ) have been prepared by solid state reaction. The appearance of the additional peak in X-ray diffraction pattern indicates the ordering of  $\text{Ti}^{4+}$  and  $\text{Ni}^{2+}$  ions. Polygonal grains are converted into flakes with an increase of Ni concentration. Replacement of  $\text{Ti}^{4+}$  by  $\text{Ni}^{2+}$  strongly modifies the relative contribution of two peaks in the Raman bands within  $200\text{-}400\text{ cm}^{-1}$ . Oxygen vacancy is observed in X-ray photoelectron spectrum to maintain charge neutrality due to aliovalent doping. Broad diffuse phase transition centered at the dielectric constant maximum indicates relaxor behaviour. Comparison between impedance and electric modulus spectrum suggests non-Debye relaxation. The ac conductivity follows the power law with the frequency exponent lies  $0.52 - 0.72$ . The generation of holes by divalent Ni dopant at tetravalent Ti sites enhances optical band gap.

Keywords: Grain size , Dielectric property , Impedance , Raman-spectra

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